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PATENT SPECIFICATION



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PROVISIONAL SPECIFICATION.

Improvements in or relating to Antifriction Bearings.

We, HARRY SIBBERING WOOD, a British subject, and RUDGE - WHITWORTH, LIMITED, a company registered under the laws of Great Britain, both of Rudge Works, Crow Lane, Coventry, in the County of Warwick, do hereby declare the nature of this invention to be as follows:—

10 This invention relates to the race rings of antifriction ball or like bearings and the formation therein or thereon of contacting surfaces adapted to give better results in working. As ordinarily produced the races on the inner ring and 15 outer ring of a ball bearing or the like are finished with a series of grinding wheels, and the cylindrical parts are also in the ordinary process ground but under any exceptional conditions of mounting, 20 speed, or end thrust as, for example, in connection with bearings for dynamos of car lighting sets, difficulty as, for instance from noise has been experienced.

25 Balls and the like which are employed in antifriction bearings are subjected to grinding after having been hardened but the result is an obvious harsh ground finish and to overcome this drawback it has been customary to resort to barrelling 30 the balls in large bulk with their fellows in order to impart a more desirable surface finish thereto.

35 The object of the present invention is to effect an improvement in the condition of the finished ball or like races.

40 The invention consists in providing the races of the bearing rings with surfaces of the same kind as those provided upon the balls or the like with which they co-operate.

45 The invention further consists in subjecting the race rings of ball or like antifriction bearings to a barrelling process for the purpose of providing thereon surfaces according to the preceding paragraph.

The invention further consists in a ball bearing or the like in which the co-operating surfaces of the ball or the like

and race ring elements are finished by 50 a barrelling process.

The invention also consists in improvements in or relating to antifriction bearings as hereinafter indicated.

55 In carrying the invention into effect, the race rings say, for example, of a ball bearing are formed in the usual well-known manner and after hardening, the surfaces are finished with a series of grinding wheels or like appliances for 60 bringing the various parts to suitable size conditions and degrees of truth and accuracy.

65 The race rings or the like prepared as above indicated are then subjected to a barrelling process by inserting them in suitable receptacles in which balls say, for example, of a size not greater than 70 those which are to be used in the bearing are being barrelled, and the barrelling process is conducted until the surfaces of the rings have acquired the desired condition approximating to the condition of the surfaces of the balls or the like with 75 which they are to co-operate.

80 Race rings treated as hereinbefore described have been found to give satisfactory results and to work without noise under conditions in which considerable difficulty has been experienced with bearings having race rings finished only by grinding processes in the manner heretofore adopted. It is further believed that 85 the race surfaces finished as above will not only work noiselessly but also possess greater durability than those finished by the usual methods heretofore adopted.

90 Although described by way of example in connection with a ball bearing, it is to be understood that the invention is applicable to antifriction roller bearings of other types, and modifications and additions may also be introduced without in any way departing from the spirit of 95 this invention.

Dated this 9th day of January, 1924.

MARKS & CLERK.

COMPLETE SPECIFICATION.

Improvements in or relating to Antifriction Bearings.

We, HARRY SIBBERING WOOD, a British subject, and RUDGE - WHITWORTH, LIMITED, a company registered under the laws of Great Britain, both of Rudge Works, Crow Lane, Coventry, in the County of Warwick, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the race rings of antifriction ball or like bearings and the formation therein or thereon of contacting surfaces adapted to give better results in working.

As ordinarily produced the races on the inner ring and outer ring of a ball bearing or the like are finished with a series of grinding wheels and the cylindrical parts are also in the ordinary process ground but under any exceptional conditions of mounting, speed or end thrusts as, for example, in connection with bearings for dynamos of car lighting sets, difficulty as, for instance, from noise has been experienced.

Balls and the like which are employed in antifriction bearings are subjected to grinding after having been hardened but the result is an obvious harsh ground finish and to overcome this drawback it has been customary to resort to barrelling the balls in large bulk with their fellows in order to impart a more desirable surface finish thereto.

The object of the present invention is to effect an improvement in the condition of the finished ball or like races.

The invention consists in providing the races of the bearing rings with surfaces of the same kind as those provided upon the balls or the like with which they co-operate.

The invention further consists in subjecting the race rings of ball or like antifriction bearings to a barrelling process for the purpose of providing thereon surfaces according to the preceding paragraph.

The invention further consists in a ball bearing or the like in which the co-operating surfaces of the ball or the like rolling elements and the race ring elements are finished by a barrelling process.

The invention also consists in improvements in or relating to antifriction bearings as hereinafter described.

In carrying the invention into effect, the race rings say, for example, of a ball

bearing are formed in the usual well-known manner and after turning and hardening the surfaces are finished with a series of grinding wheels or like appliances for bringing the various parts to suitable size conditions and degrees of truth and accuracy. The usual fine polishing operation by means of a very fine wheel or leather or felt buff may be however, omitted.

When determining the size condition a sufficient amount of metal must be left on the rings to allow for the next operation. This is found to be in the neighbourhood of .0002" so that the bore of a ring will be .0004" smaller than its finished size, whereas the external diameter and width will be the same amount larger than its finished size.

The race rings or the like prepared as above indicated are then subjected to a barrelling process by inserting them in barrels with a large quantity of steel balls for "reducing". The barrels employed are of the ordinary type, having their axes inclined to the horizontal. The speed at which they are rotated depends on the size of ring to be polished—the larger the ring the slower the speed of rotation and *vice versa*. For rings, say in the neighbourhood of some one or two inches diameter, a speed of 60 r.p.m. has been found satisfactory, but this is variable within fairly wide limits; probably 80 r.p.m. would not be detrimental. With larger bearings, however, it is found that at speeds in excess of 60 r.p.m. the rings knock together and bruise one another, whereas for smaller rings the higher speeds can be used with advantage. The balls employed must necessarily be smaller in diameter than the curvature of the track in the ring and as a principle it is found that the smaller the ball that can be used the better is the result obtained in the track, but there are limits to the size of the balls, as it is found that if very small balls are used the bearings do not get properly covered but "float" upon the top of the balls. It would be safe to say that as a principle, balls with a radius of from $\frac{1}{32}$ " to $\frac{1}{16}$ " less than the radius of curvature of the race give the best results.

With the races and balls a "reducing" medium is employed, consisting of an abrasive powder, such as emery, or preferably aloxite, and paraffin, the proportions being for the first part of the

operation which may occupy 20 hours
2 lb. of aloxite to 2 gallons of paraffin;
for the second part of this operation
which may occupy 10 hours $\frac{1}{4}$ lb.
5 aloxite to 2 gallons of paraffin. The
object of this operation is to take out
all grinding marks and to obtain a
"matte" surface that will take a high
polish.

10 When a satisfactory surface of this
nature is obtained the bearings are taken
from the reducing barrels, thoroughly
washed and are then put into polishing
barrels with balls of approximately the
15 same size as before, with a medium of
potash and water; the proportions of
potash to water are in the neighbourhood
of 1 lb. to 2 gallons of water, but it is
found beneficial to use for the first
20 period of polishing which may be some-
where in the neighbourhood of 4 hours
potash that has been used before and
after this period to take away about half
of the old potash and make up to the
25 original quantity with new potash.

Bearings of different size may be
barrelled together, but the degree of
variation is limited by consideration of
the speed of the barrel, as mentioned
30 above. The barrelling process is con-
ducted until the surfaces of the rings
have acquired the desired condition
approximating to the condition of the
surfaces of the balls or the like with
35 which they are to co-operate.

Race rings treated as hereinbefore
described have been found to give satis-
factory results and to work without noise
under conditions in which considerable
40 difficulty has been experienced with bear-
ings having race rings finished only by
grinding processes in the manner hereto-
fore adopted. It is further believed that
the race surfaces finished as above will
45 not only work noiselessly but also possess

greater durability than those finished by
the usual methods heretofore adopted.

Although described by way of example
in connection with a ball bearing, it is
to be understood that the invention is 50
applicable to antifriction roller bearings
of all types generally and the improved
method may be introduced in any bear-
ing having race rings and rolling ele-
ments without in any way departing from 55
the spirit of this invention.

Having now particularly described and
ascertained the nature of our said inven-
tion and in what manner the same is to
be performed, we declare that what we 60
claim is:—

1. A method of preparing the surfaces
of antifriction bearings consisting in pro-
viding the races of the bearing rings
with a surface finish produced by 65
repeated impact or contact with other
elements in like manner to that provided
upon the balls or other rolling elements
with which they co-operate.

2. A method according to Claim 1, con- 70
sisting in subjecting the race rings of
ball or like antifriction bearings to a
barrelling process for the purpose of pro-
viding thereon surfaces of a like nature
to those provided upon the ball or like 75
rolling elements.

3. A ball bearing or the like in which
the co-operating surfaces of the ball or
the like rolling elements and the race
ring elements are finished by a barrelling' 80
process.

4. An antifriction bearing race ring
having at least its working surfaces
finished by a barrelling process.

5. The improved process for the pro- 85
duction of contact surfaces on the ele-
ments of antifriction bearings, substan-
tially as hereinbefore described.

Dated this 30th day of July, 1924.

MARKS & CLERK. 90